Physical Sciences Division

Instrumentation

Boundary Layer Profiler Network

- Data
- Slide Presentation

Publications

- Coastal Orographic Rainfall Processes Observed by Radar during the California Land-Falling Jets Experiment
- An Automated Brightband Height Detection Algorithm for Use with Doppler Radar Spectral Moments

The NOAA/ETL boundary layer windprofiler network is a portable, configurable network of wind profilers, meteorological observation towers and RASS units for the observation of regional weather systems impacting air quality and severe weather.

Disdrometers

The Distromet LTD Model RD-80 disdrometer uses the momentum of falling raindrops to measure the size distribution of rain. The amplitude of the pulse generated as a drop hits the disdrometer's electromechanical transducer is roughly proportional to the drop's momentum and, ultimately, the drop's diameter. The size range of drops that can be measured spans from 0.3 mm to 5 mm. Drops larger than 5 mm are rare because they tend to be unstable and breakup into smaller drops. By comparing disdrometer measurements from coastal and inland mountain sites, we will learn more about the microphysical processes associated with orographic precipitation, one of the underlying goals of PACJET. The disdrometer measurements will also shed light on the microphysical information derived from the X-band polarimetric scanning radar and the S-band vertically pointing radars deployed for PACJET-2003. The integrated size distribution measured by the disdrometer is a direct measurement of the rainfall intensity, which will be compared to the rainfall intensities measured by a variety of other rain gauges and estimated by the radars. These comparisons will be used to diagnose the strengths and limitations of various in situ and remote sensing measurement techniques used to provide rainfall intensity.

S-band Profiler

- Data
- Extending the Dynamic Range of an S-Band Radar for Cloud and Precipitation Studies
- More S-band Information

The S-band vertical profiler is based on existing S-band and UHF profiler technology which has been modified for research. It's dynamic range has been extended to study moderate to heavy precipitation which would not be otherwise possible. The S-band has been calibrated through a side-by-side comparison with the Ka-band radar. In a typical cloud profiling mode of operation, the sensitivity is -14 dBZ at 10 km. Examples taken from a recent field campaign illustrate the profiler's ability to measure vertical velocity and radar reflectivity profiles in clouds and precipitation.

Water Content Reflectometers

Volumetric soil water content measurements are made using the Campbell Scientific CS 616 water content reflectometers. These instruments estimate soil water content by measuring the time it takes an electromagnetic pulse to traverse a 30 cm waveguide formed in the soil by two parallel rods spaced 3.0 cm apart. At the Rio Nido, Cazadero, Healdsburg, and Hopland locations the reflectometers are buried horizontally at a depth of 15 cm. The Lake Sonoma and Big Sulfur Creek probes are buried at 7.5 cm because the soils in these elevated locations are thinner and contain large amounts of gravel. Individual calibrations are developed for each site based on drying and weighing soil samples taken in the immediate vicinity of the probe. The measurements are also corrected for variations in soil temperature using a themistor buried at the same depth as the refectometer.

X-band Polarimetric Radar

- Data
- More X-band Information

ETL developed this state-of-the-art X-band radar primarily for observations of the ocean surface, rain, snow, storm airflow patterns, and for hydrological applications. It has Doppler, dual-polarization, and full scanning capability, including the ability to scan downward beneath the horizon for ocean work. Fine-scale measurements are possible with selectable range resolution from 7.5 to 150 meters. Polarization options include switching between H and V, or using the "split" H/V, configuration that has been proposed for future NEXRAD upgrades. The polarization measurements include differential phase (Kdp), and differential reflectivity (ZDR), which can used for more accurate estimates

of rainfall rate and identification of precipitation particle types. The radar uses ETL's new Radar Acquisition and Display System (RADS), which allows various options for scan control and computing derived parameters in realtime. The radar is transportable in North America on its own trailer bed or it can be shipped overseas in standard sea containers. ETL engineers are working toward implementing fully automated, unattended operation and remote control of this system.

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http://www.esrl.noaa.gov/psd/programs/2004/hmt/instruments.html

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